

BEAMLINES

SPring-8 beamlines are categorized into the following groups.

- (1) Public Beamlines
- (2) Contract Beamlines
- (3) JAERI / RIKEN Beamlines
- (4) Accelerator Beam Diagnosis

The public beamlines were constructed by JAERI and RIKEN on government grants and are available for public use. Among them, three beamlines have been used for R&D. Since the 2005A period, the status of the three R&D beamlines has been changed to public beamlines on the recommendation of the R&D Beamline Review Committee, although one of the three (BL46XU) temporarily retained its R&D function. At present, 25 public beamlines (22 X-ray beamlines, two soft X-ray beamlines and one infrared beamline) are operational and available for public use.

The contract beamlines are, on the other hand, installed, owned, operated and maintained by universities, companies and other organizations for exclusive use by contractors. Twenty percent of beamtime is, in principal, offered to public use by contract. Hyogo Prefecture took the lead in contract beamline construction, followed by Industrial Consortium, National Synchrotron Radiation Research Center (NSRRC, Taiwan), Institute for Protein Research (Osaka Univ.), Research Center for Nuclear Physics (RCNP, Osaka Univ.), National Institute for Materials Science, and Pharmaceutical Consortium, in that order.

NSRRC was the first to construct foreign contract beamlines (BL12B2 and BL12XU) at SPring-8. Currently, these nine contract beamlines are all in operation.

The JAERI/RIKEN beamlines are those constructed by JAERI and RIKEN for the exclusive use to promote their own research activities, although 20% of beamtime is reserved for public use. JAERI has already been constructed four beamlines. Experimental stations of BL22XU and BL23SU are located at RI Laboratory and dedicated to research utilizing radioactive isotopes and actinide materials. RIKEN has constructed six beamlines. As of April 2005, one beamline (BL17SU) has been in the commissioning phase. BL19LXU is the sole long undulator beamline and can provides the highest brilliance of all beamlines. BL26B1 and BL26B2 are beamlines used for high throughput protein crystallography in the line with the human genome project. BL29XU has two experimental stations, one located in the experimental hall, and the other at the end of the 1 km beamline.

Dedicated to studying the characteristics of the electron beam accumulated in the storage ring, the accelerator beam diagnosis beamlines are currently under the exclusive use of the JASRI accelerator group.

All 62 beamlines that SPring-8 can accommodate (34 insertion devices, 4 long undulators, 23 bending magnets and 1 infrared) are shown on the Beamline Map (Fig. 2). Including the two accelerator beam diagnosis beamlines, there are 47 beamlines, which is about 75% of full capacity (Table II).

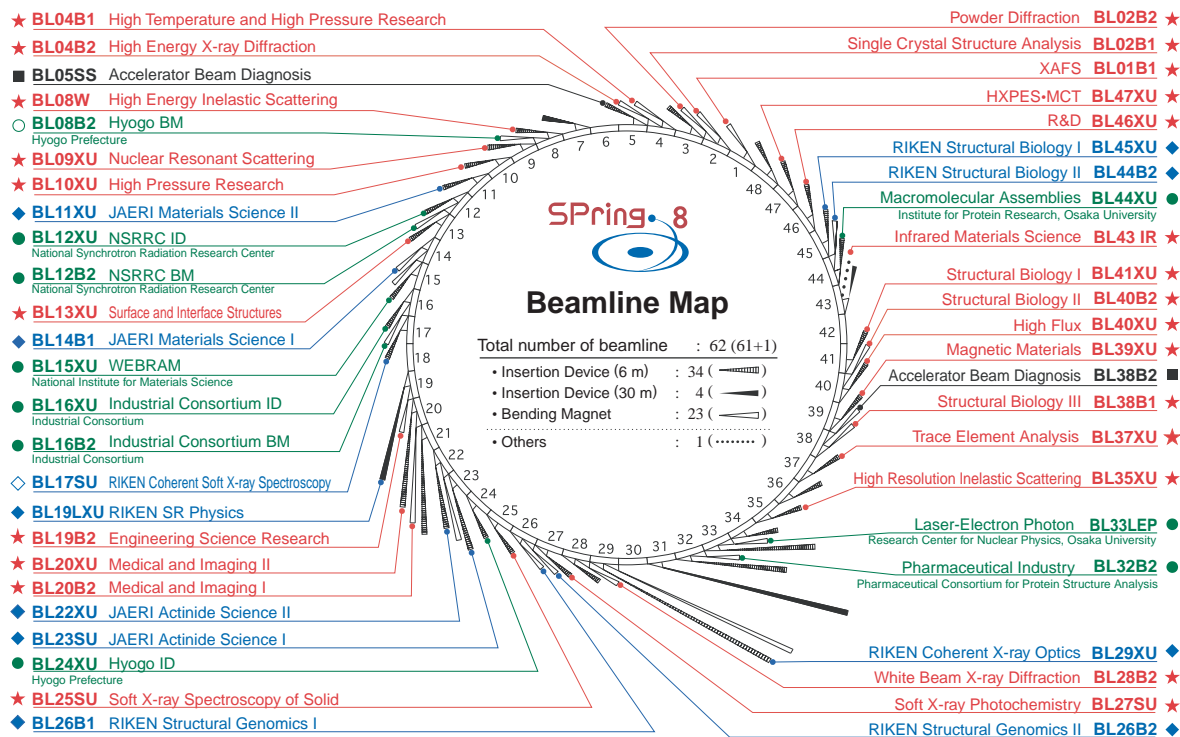


Fig. 2. Beamline Map.

Table II. List of beamlines

BL #	Beamline Name	(Public Use)	Areas of Research
★ Public Beamlines			
BL01B1	XAFS	(Oct. 1997)	XAFS in wide energy region (3.8 to 113 keV). XAFS of dilute systems and thin films.
BL02B1	Single Crystal Structure Analysis	(Oct. 1997)	Structure physics using single crystal analysis. Precise structure analysis of photo-excited state.
BL02B2	Powder Diffraction	(Sep. 1999)	Accurate structure analysis of crystalline materials using powder diffraction data by Rietveld refinements and MEM (maximum entropy method).
BL04B1	High Temperature and High Pressure Research	(Oct. 1997)	Mineral physics at high temperature and high pressure. Energy-dispersive X-ray diffraction and X-ray radiography using the large-volume press.
BL04B2	High Energy X-ray Diffraction	(Sep. 1999)	Structural analysis of glass, liquid, and amorphous materials. X-ray diffraction under ultra high-pressure. Precise single crystal structure analysis
BL08W	High Energy Inelastic Scattering	(Oct. 1997)	Magnetic Compton scattering. High-resolution Compton scattering. High-energy Bragg scattering. High-energy fluorescent X-ray analysis.
BL09XU	Nuclear Resonant Scattering	(Oct. 1997)	Time domain Mössbauer spectroscopy. Lattice dynamics study using nuclear resonant scattering.
BL10XU	High Pressure Research	(Oct. 1997)	Structure physics and earth science under ultra high pressure using DAC.
BL13XU	Surface and Interface Structures	(Sep. 2001)	Atomic-scale structure analysis of an ultra-thin film, nanostructure and surface, using in-air measurements (room temperature to 500 °C) and in-vacuum measurements (20 to 1300 K).
BL19B2	Engineering Science Research	(Nov. 2001)	Industrial application using XAFS in wide energy region, residual stress measurement, structural analysis of thin film, surface and interface, powder diffraction, and X-ray imaging.
BL20XU	Medical and Imaging II	(Sep. 2001)	Medical application: Microangiography, refraction-enhanced imaging. / Micro-imaging: Scanning microscopy, imaging microscopy, microtomography, X-ray holography and X-ray optics. / Ultra-small angle scattering.
BL20B2	Medical and Imaging I	(Sep. 1999)	Medical application: Microradiography, microtomography and refraction-enhanced imaging. / Micro-imaging: R&D of optical elements for novel imaging techniques.
BL25SU	Soft X-ray Spectroscopy of Solid	(Apr. 1998)	High resolution photoemission spectroscopy. Photoelectron diffraction and holography. Magnetic circular dichroism (MCD). Photoelectron emission microscope (PEEM).
BL27SU	Soft X-ray Photochemistry	(May 1998)	Industrial research of functional material. Atomic and molecular spectroscopy by high resolution electron spectroscopy. Surface analysis and solid state physics.
BL28B2	White Beam X-ray Diffraction	(Sep. 1999)	White X-ray diffraction. Time-resolved energy-dispersive XAFS (DXAFS).
BL35XU	High Resolution Inelastic Scattering	(Sep. 2001)	Material dynamics on ~ meV energy scales using inelastic X-ray scattering (IXS) and nuclear resonant scattering (NRS).
BL37XU	Trace Element Analysis	(Nov. 2002)	X-ray microbeam spectrochemical analysis. Ultra trace element analysis. High energy X-ray fluorescence analysis.
BL38B1	Structural Biology III	(Oct. 2000)	XAFS. R&D of optics and detector. Macromolecular crystallography.
BL39XU	Magnetic Materials	(Oct. 1997)	X-ray magnetic circular dichroism (XMCD) spectroscopy. Element-specific magnetometry. X-ray emission spectroscopy and its magnetic circular dichroism. Resonant or non-resonant magnetic scattering.
BL40XU	High Flux	(Apr. 2000)	Time-resolved diffraction and scattering experiments. X-ray speckle. X-ray fluorescence trace analysis.
BL40B2	Structural Biology II	(Sep. 1999)	Macromolecular crystallography. Small angle X-ray (solution) scattering.
BL41XU	Structural Biology I	(Oct. 1997)	Biological macromolecular crystallography.
BL43IR	Infrared Materials Science	(Apr. 2000)	Infrared microspectroscopy. Magneto-optical spectroscopy. Infrared surface science. Absorption and reflection spectroscopy. Time-resolved experiments with pulsed laser and SR (pump and probe).
BL46XU	R&D	(Nov. 2000)	Insertion devices R&D. Resonant and non-resonant magnetic scattering structural analysis.
BL47XU	HXPES • MCT	(Oct. 1997)	R&D of microtomography and microbeam technique. High energy photoemission spectroscopy.

BL #	Beamline Name (First Beam)	Areas of Research
● Contract Beamlines		
BL12XU	NSRRC ID (NSRRC) (Dec. 2001)	High resolution non-resonant or resonant inelastic X-ray scattering. High resolution near-edge X-ray Raman scattering. Phase transitions under high-pressure, low and high temperatures. High-resolution X-ray absorption and emission spectroscopy. X-ray physics and optics.
BL12B2	NSRRC BM (NSRRC) (Oct. 2000)	X-ray absorption spectroscopy. Powder X-ray diffraction. High resolution X-ray scattering. Protein crystallography.
BL15XU	WEBRAM (National Institute for Materials Science) (Jan. 2000)	High resolution X-ray photoemission microscopy. High energy excitation X-ray photoelectron spectroscopy. High resolution X-ray emission spectroscopy. Highly precise X-ray powder diffraction and ultra-small angle scattering.
BL16XU	Industrial Consortium ID (Industrial Consortium) (Oct. 1998)	Characterization of thin films for ULSI and magnetic devices, catalysts, functional materials, and structural materials by X-ray diffraction, fluorescence X-ray analysis, X-ray magnetic circular dichroism, and imaging with X-ray microbeam.
BL16B2	Industrial Consortium BM (Industrial Consortium) (Oct. 1998)	Characterization of industrial materials, such as metal and oxide films, semiconductor crystals by XAFS, topography and other methods.
BL24XU	Hyogo (Hyogo Prefecture) (May 1998)	Structure analysis of small bio-crystals for industry. Surface/interface analysis for industry by fluorescent X-ray analysis, strain measurements and grazing incidence X-ray diffraction. Microbeam formation studies for materials and life sciences.
BL32B2	Pharmaceutical Industry (Pharmaceutical Consortium) (Apr. 2002)	Protein structure analysis for structure-based drug design: Design and optimization of new leading compounds based on pharmacodynamic action mechanism elucidated at the molecular level which obtained from a detailed interaction analysis of receptor-drug complexes.
BL33LEP	Laser-Electron Photon (Osaka University) (Jun. 1999)	Meson photoproduction from nucleon and nucleus. Photoexcitation of hyperons, nucleon resonances, and other exotic states. Photonuclear reactions. Beam diagnoses. Test and calibration of detectors with GeV photon beam.
BL44XU	Macromolecular Assemblies (Osaka University) (May 1999)	Crystal structure analysis of biological macromolecular assemblies (e.g. membrane complexes, protein complexes, protein-nucleic acid complexes, and viruses).
◆ JAERI Beamlines		
BL11XU	JAERI Materials Science II (Oct. 1998)	Nuclear resonant scattering. Surface and interface structure with MBE. Inelastic scattering. XAFS.
BL14B1	JAERI Materials Science I (Dec. 1997)	Materials science at high pressure. Structure physics.
BL22XU	JAERI Actinide Science II (May 2002)	Materials science at high pressure. Resonant X-ray scattering (activity at RI laboratory).
BL23SU	JAERI Actinide Science I (Feb. 1998)	Surface chemistry with supersonic molecular beam. Biophysical spectroscopy. Photoelectron spectroscopy (activity at RI laboratory). Magnetic circular dichroism (activity at RI laboratory).
◆ RIKEN Beamlines		
BL17SU	RIKEN Coherent Soft X-ray Spectroscopy (Sep. 2003)	Spectroscopy of multiply charged ions. Angle-resolved photoemission spectroscopy (ARPES). Soft X-ray emission spectroscopy.
BL19LXU	RIKEN SR Physics (Oct. 2000)	Any research field requiring the highly brilliant X-ray beam.
BL26B1/B2	RIKEN Structural Genomics I & II (Apr. 2002)	Structural genomics research based on single crystal X-ray diffraction.
BL29XU	RIKEN Coherent X-ray Optics (Dec. 1998)	X-ray optics, especially coherent X-ray optics.
BL44B2	RIKEN Structural Biology II (Feb. 1998)	Macromolecular crystallography.
BL45XU	RIKEN Structural Biology I (Jul. 1997)	Macromolecular crystallography. Time-resolved structures of non-crystalline biological materials using small-angle scattering and diffraction technique.
■ Accelerator Beam Diagnosis		
BL05SS	Accelerator Beam Diagnosis (Mar. 2004)	Accelerator beam diagnostics. R&D of accelerator components.
BL38B2	Accelerator Beam Diagnosis (Sep. 1999)	Accelerator beam diagnostics. R&D of accelerator components. Production of MeV γ -ray photons.